Small Business Innovation Research/Small Business Tech Transfer

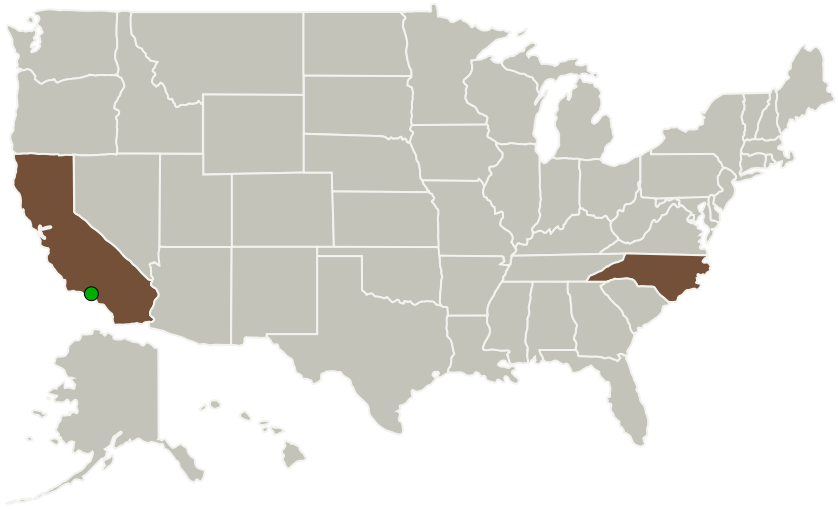
Six-Axis Force-Torque Transducer for Mars 2018 Mission, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

The use of automated robotic tooling is required in a number of space missions. It is possible to have better tool control if the robotic arm could report loads experienced by the tooling. ATI Industrial Automation proposes to develop and prove technologies to be used in a low weight, low outgassing multi-axis force and torque transducer that can be used at cryogenic temperatures. The transducer will require strain gage excitation electrical power and output strain gage level voltage signals. These signals can be digitized and then mathematically transformed into values that represent the transducer's loads as forces in the X, Y, and Z axes and torques about the X, Y, and Z axes. The primary goal of this phase I proposal is to develop, produce, and characterize a proof of concept strain-sensing beam that can survive the harsh environments expected to be encountered on a Mars lander mission. The main challenges of this proposal are the development of a strain-sensing beam that can 1) survive and operate over wide temperature ranges, and 2) operate at low atmospheric pressure with minimal outgassing.

Primary U.S. Work Locations and Key Partners



Six-Axis Force-Torque Transducer for Mars 2018 Mission, Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
ATI Industrial Automation, Inc.	Lead Organization	Industry	Apex, North Carolina
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	North Carolina

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140295)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

ATI Industrial Automation, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Dwayne Perry

Co-Investigator:

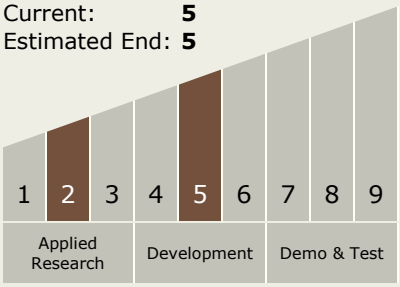
Dwayne Perry

Six-Axis Force-Torque Transducer for Mars 2018 Mission, Phase I

Completed Technology Project (2012 - 2012)

Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.5 Autonomous Rendezvous and Docking
    - TX04.5.7 Modeling, Simulation, Analysis, and Test of Rendezvous, Proximity Operations, and Capture

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System